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GENETICAL STUDIES ON ZIMIKAND (*Amorphophallus campanulatus Blume.*)

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ABSTRACT: Phenotypic and genotypic coefficient of variation, heritability, correlation coefficient and path analysis were estimated for plant height, length of leaf, stem diameter, equatorial diameter and corm yield per plant in zimikand (*Amorphophallus campanulatus* Blume). The experiment comprising 18 diverse genotypes have been sown in RBD with 3 replications during 2002-03 and 2003-04 at Vegetable Reaserch Farm of C.S.Azad Uni. of Agr. & Tech.Kalyanpur, Kanpur. The analysis of variance revealed highly significant differences among genotypes for all the characters. High heritability accompanied with moderate genetic advance as per cent of mean for different characters suggested that improvement in corm yield may be made through selection. Phenotypic correlation coefficients of all characters with yield were found positive and highly significant. Yield per plant had strong positive correlation with equatorial diameter and stem diameter at genotypic level. The path coefficient revealed maximum direct effect of equatorial diameter on yield followed by length of leaf in both the years while plant height showed negative direct effect on yield. Thus, the characters like equatorial diameter and leaf length may be considered while making selection for the improvement of yield in zimikand.

Keywords : *Amarphophalus, GCV, PCV, heritability, genetic advance.*

Elephant foot yam or zimikand is an economical and underground tropical tuber crop with a long storage quality. It is cultivated for its corms, used as vegetables. It has both nutritional and medicinal values with high dry matter production capability per unit area than most of the other vegetables. It is originated in India and grown for its under ground tubers which can be stored for long period. It is a popular tuber crop, grown as a vegetable in eastern Uttar Pradesh and many other parts of India. It is a highly remunerative crop which renders its cultivation profitable.

MATERIALS AND METHODS

Studies on variability, heritability, correlation coefficient and path analysis were carried out on 18 diverse genotypes of zimikand for five quantitative characters namely plant height (cm), length of leaf (cm), stem diameter (cm), equatorial diameter (cm) and corm yield per plant (kg). The experiment was conducted for two consecutive years 2002-03 and 2003-04 in RBD with three replications. Ten plants in each replication represented each genotype. During crop growth and at harvest, observations were recorded on five randomly selected plants. The data were analyzed as per procedure given by Panse and Sukhatme (3). Genetic coefficients of variation were estimated by the formula suggested by Burton (1). Heritability in broad sense was calculated in accordance with Hanson *et al.* (2).

RESULTS AND DISCUSSION

The analysis of variance revealed highly significant differences among genotypes for all the five characters viz; plant height, length of leaf, stem diameter, equatorial diameter and corm yield/plant (Table 1). The length of leaf showed maximum genetic coefficient of variation during both the years, while yield per plant exhibited minimum genotypic coefficient of variability. During 2002-03, the maximum *pcv* was observed for length of leaf while stem diameter showed the maximum *pcv* during 2003-04. Similar to *gcv*, yield per plant exhibited minimum *pcv* in both the years. The heritability ranged from 72 to 85 per cent for equatorial diameter being minimum and length of leaf and yield/plant being maximum during

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Table 1: Analysis of variance for 5 characters in zimikand.

Source of variance	df	MSS									
		Plant height		Length of leaf		Stem diameter		Equatorial diameter		Corm Yield/plant	
		2002-03	2003-04	2002-03	2003-04	2002-03	2003-04	2002-03	2003-04	2002-03	2003-04
Rep.	2	36.61*	1.34	35.6**	3.54	0.04	0.09*	7.94	3.96	2.81	0.07
Treat.	17	133.02**	151.47**	86.10**	55.14**	0.31**	0.34**	53.68**	46.86**	24.81**	15.09*
Error	34	7.70	5.87	4.49	2.41	0.02	0.02	6.15	3.19	1.34	3.26

*Significant at 5% level; **Significant at 1% level

Table 2: G.C.V., P.C.V., heritability and genetic advance in per cent over mean for different characters in zimikand.

Characters	GCV		PCV		Heritability in % (bs)		Genetic advance in % over mean	
	2002-03	2003-04	2002-03	2003-04	2002-03	2003-04	2002-03	2003-04
Plant height	16.37	18.89	17.81	20.00	84	89	30.97	36.77
Length of leaf	19.63	19.69	21.18	21.00	85	87	37.44	38.06
Stem diameter	17.37	19.59	19.10	21.10	82	86	32.40	39.37
Equatorial diameter	14.28	15.40	16.83	17.00	72	82	24.98	28.74
Corm yield/plant	8.84	6.46	9.57	8.72	85	54	16.82	3.85

Table 3: Phenotypic (Upper diagonal) and genotypic (Lower diagonal) correlation coefficient for different characters in zimikand.

Characters	Plant height		Length of leaf		Stem diameter		Equatorial diameter		Yield	
	2002-03	2003-04	2002-03	2003-04	2002-03	2003-04	2002-03	2003-04	2002-03	2003-04
Plant height			0.578**	0.811**	0.681**	0.722**	0.761**	0.338	0.454**	0.481**
Length of leaf	0.513	0.724			0.760**	0.879**	0.552**	0.375	0.568**	0.622**
Stem diameter	0.615	0.666	0.640	0.775			0.691**	0.531**	0.554**	0.631**
Equatorial diameter	0.629	0.305	0.430	0.328	0.565	0.492			0.639**	0.847**
Yield	0.379	0.316	0.456	0.492	0.510	0.465	0.500	0.591		

T**able 4: Direct and indirect effects of different characters on yield in zimikand.**

Characters	Year	Plant height	Length of leaf	Stem diameter	Equatorial diameter	Genotypic correlation for yield
Plant height	2002-03	**-0.217**	0.197	0.022	0.452	0.454
	2003-04	**-0.138**	0.588	-0.238	0.269	0.481
Length of leaf	2002-03	-0.126	**0.341**	0.024	0.328	0.568
	2003-04	-0.112	**0.725**	-0.290	0.299	0.622
Stem diameter	2002-03	-0.148	0.259	**0.032**	0.411	0.554
	2003-04	-0.100	0.638	**-0.330**	0.423	0.631
Equatorial diameter	2002-03	-0.165	0.188	0.022	**0.594**	0.639
	2003-04	-0.047	0.272	-0.175	**0.797**	0.847

Bold values showed direct effect

Residual effect – 0.507

0.650

2002-03. During 2003-04, the maximum heritability was recorded for plant height while minimum for yield per plant. The genetic advance in % age over mean reflects that length of leaf and stem diameter showed maximum during 2002-03 and 2003-04, respectively while yield per plant exhibited minimum in each year. Thus the genetic material under study had great genetic variability. High heritability accompanied with moderate genetic advance as per cent of mean revealed that improvement in the corm yield may be made through selection (Table 2).

Generally phenotypic correlation coefficients were higher than their genotypic correlation coefficients (Table 3), which reflected that environments have role for the expression of these characters. At genotypic level, yield had very strong correlation with equatorial diameter, stem diameter and length of leaf during each year. Among yield components, length of leaf had very strong correlation with stem diameter and plant height. Yield had positive and significant correlation with length of leaf, stem diameter and equatorial diameter, while remaining combinations showed positive correlation coefficient at phenotypic level.

A perusal of data (Table 4) revealed maximum positive direct effect of equatorial diameter on yield followed by length of leaf. The yield had positive and strong genotypic correlation with these characters. Plant height had negative direct effect on yield. However, it had positive genotypic correlation which may be due to positive indirect effect of equatorial diameter and leaf length. The high residual values (0.507 and 0.650) revealed that many characters have been left for study.

On the basis of above studies it may be concluded that equatorial diameter and length of leaf are the major yield components. Hence selection should be based on these two characters, while making selection for the improvement in zimikand.

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